UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/730,817	12/08/2003	Daniel Owen	1801270.00134US1	4224

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WILMERHALE/BOSTON
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EXAMINER
KANG, INSUN

ART UNIT	PAPER NUMBER
2193	

NOTIFICATION DATE	DELIVERY MODE
11/02/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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	Application No.	Applicant(s)
Office Action Summary	10/730,817	OWEN ET AL.
	Examiner	**Art Unit**	
	Insun Kang	2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 August 2007*.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,6-18,20,23,25-38,41,43-58 and 80-85* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,6-9,14,20,23,25-28,33,38,41,43-46,51 and 83* is/are rejected.

7)☐ Claim(s) *10-13, 15-18, 29-32, 34-37,47-50, 52-58, 80-82, 84, and 85* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

1.   This action is in response to the amendment filed 8/15/2007.

2.   As per applicant's request, claims 1, 4, 6, 8-11, 13, 14, 20, 23, 25, 27-30, 32, 33, 38, 41,

43, 45-48, 50, and 51 have been amended. Claims 1, 4, 6-18, 20, 23, 25-38, 41, 43-58, and 80-

85 are pending in the application.

Allowable Subject Matter

3.   Claims 10-13, 15-18, 29-32, 34-37, 47-50, 52-58, 80-82, 84 and 85 are objected to as

being dependent upon a rejected base claim, but would be allowable if rewritten in independent

form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5.   Claims 1, 4, 7, 8, 14, 20, 23, 26, 27, 33, 38, 41, 44, 45, 51, and 83 are rejected under 35

U.S.C. 102(b) as being anticipated by Souloglou et al. (WO 00/22521, published on 4/2000)

hereafter Souloglou.

Per claim 38:

Souloglou discloses:

- a decoding mechanism configured to decode instructions in the subject program code; an intermediate representation generating mechanism configured to generate an intermediate representation of the decoded instructions (i.e. "translated in Basic Blocks, via an intermediate representation, into code of a target processor," page 2, second paragraph)

- including providing a plurality of possible types of nodes in the intermediate representation as abstract representations of the expressions, calculations, and operations performed by the instructions of the subject program code selected from a plurality of possible types of nodes including at least base nodes and complex nodes, , and wherein the complex nodes provide a more compact representation of the semantics of complex instructions in the subject program code than that of base node representations (i.e. *"an emulation...to translate ...Basic Block by Basic Block,"* page 11, lines 21-26; "When a *complex instruction* is decoded from a subject processor code into the intermediate representation," page 13, first paragraph; *"CISC* (Complex Instruction Set Computer) instruction set," page 13, first paragraph (a complex instruction can be decomposed into basic blocks; "if it is determined that no combination is so required, reading directly from the appropriate register," page 5, last 4-5 lines).

-and an intermediate representation type determining mechanism configured to determine which type of nodes to generate in the intermediate representation for each respective instruction in the decoded subject program code (i.e. "if there is a stored target code representing a Basic Block for a given entry condition," page 11, second paragraph).

Per claim 41:

Souloglou further discloses:

- wherein base nodes are generic across a plurality of possible subject architectures (i.e. An IR

Block is a block of intermediate representation," page 11, third paragraph).

Per claim 44:

Souloglou further discloses:

- wherein a complex node may be decomposed into a plurality of base nodes to represent the

same semantics of an instruction in the decoded program code (i.e. *"CISC* (Complex Instruction

Set Computer) instruction set," page 13, first paragraph (a complex instruction can be

decomposed into basic blocks).

Per claim 45:

Souloglou further discloses:

- wherein the program code is designed to be executed by a subject architecture, the intermediate

representation generating mechanism further comprising a complex node generating mechanism

for generating complex nodes only for those features correspondingly configurable on the subject

architecture (i.e. "if data required for an access lies within more than one valid abstract register,"

page 6, section c); page 5, last 4-5 lines).

Per claim 51:

Souloglou further discloses:

- wherein the plurality of possible types of nodes further include base nodes and architecture

specific nodes (i.e. "Basic Blocks...The back End is specific to the target processor," page 16,

lines 16-31).

Per claim 83.

Souloglou further discloses:

Dynamic binary translation from the subject code as binary machine code of a subject instruction set architecture into the target code as binary machine code of a target instruction set architecture (i.e. "The system is a dynamic binary translation system…into target processor code as they are required for execution," page 16, lines 1-3).

Per claims 1, 4, 7, 8, and 14, they are the method versions of claims 38, 41, 44, 45, and 51, respectively, and are rejected for the same reasons set forth in connection with the rejection of claims 38, 41, 44, 45, and 51 above.

Per claims 20, 23, 26, 27, and 33, they are the medium versions of claims 38, 41, 44, 45, and 51, respectively, and are rejected for the same reasons set forth in connection with the rejection of claims 38, 41, 44, 45, and 51 above.

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7.   Claims 6, 25, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Souloglou et al. (WO 00/22521, published 4/2000) hereafter Souloglou in view of Lueh et al.

(US Patent 6,292,935) hereafter Lueh.

       Per claim 43:

       Souloglou does not explicitly teach that complex nodes represent immediate type

instructions in which a constant operand value is encoded into the immediate type instruction

itself in an immediate field.   However, Lueh teaches such nodes was known in the pertinent art,

at the time applicant's invention was made, to save a register usage by preserving the operand

value within the instruction itself (i.e. immediate operands...which are constant values," col. 5

lines 7-31). It would have been obvious for one having ordinary skill in the art to modify

Souloglou's disclosed system to incorporate the teachings of Lueh. The modification would be

obvious because one having ordinary skill in the art would be motivated to prevent a register

usage as suggested by Lueh (col. 5 lines 7-31).

       Per claim 6, it is the method version of claim 43, respectively, and is rejected for the

same reasons set forth in connection with the rejection of claim 43 above.

       Per claim 25, it is the medium version of claim 43, respectively, and is rejected for the

same reasons set forth in connection with the rejection of claim 43 above.

8.   Claims 9, 28, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Souloglou et al. (WO 00/22521, published 4/2000) hereafter Souloglou in view of Lattner et al.

("The LLVM Instruction Set and Compilation Strategy," 8/9/2002).

Per claim 46:

Souloglou does not explicitly teach that the plurality of possible types of IR nodes further include polymorphic nodes. However, Lattner teaches such nodes was known in the pertinent art, at the time applicant's invention was made, to perform a single operation on several different types of operands (i.e. "LLVM instructions are polymorphic," a single instruction...can operate on several different types of operands," page 4, section 3.2, third paragraph)." It would have been obvious for one having ordinary skill in the art to modify Souloglou's disclosed system to incorporate the teachings of Lattner. The modification would be obvious because one having ordinary skill in the art would be motivated to reduce the number of distinct opcodes by using polymorphism (page 4, section 3.2, third paragraph) as suggested by Lattner.

Per claim 9, it is the method version of claim 46, respectively, and is rejected for the same reasons set forth in connection with the rejection of claim 46 above.

Per claim 28, it is the medium version of claim 46, respectively, and is rejected for the same reasons set forth in connection with the rejection of claim 46 above.

Response to Arguments

9.   Applicant's arguments filed on 8/15/2007 have been fully considered but they are not persuasive.

The applicant states that: Souloglou only discloses breaking down a complex instruction into a plurality of base nodes. By contrast, the claimed invention recites that this one complex instruction is instead represented by one complex node in the intermediate representation and is not decomposed into a plurality of base nodes (remark, 16).

In response, the claims do not recite that the complex instruction is maintained without being further decomposed into a plurality of base nodes. Furthermore, the complex instruction representation is first generated before being decomposed into base nodes.

The applicant states that: There is no intermediate representation in Lueh. Thus, it is improper to combine the mimic stack of Lueh with intermediate representation as in Souloglou.

In response to statement 2), Lueh is directed to Java byte code where the intermediate representation is translated into executables. Therefore, it is considered to be proper to combine Lueh with Souloglou.

Conclusion

10.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

11.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Insun Kang whose telephone number is 571-272-3724. The

examiner can normally be reached on M-F 8:30-5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, MENG AI AN can be reached on 571-272-3756. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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